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In re Patent Application of:  
**YOON**  
Serial No. **09/988,881**  
Filing Date: **November 20, 2001**

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**REMARKS**

The Examiner is thanked for the thorough examination of the present application. FIGS. 3-6 have been amended to address the noted informalities, as helpfully pointed out by the Examiner. In particular, FIGS. 3 and 5 have been amended to show fixed attachments between the elongate members, the first and second shafts, and the pulleys in accordance with the specification. Additionally, the rotating pins and certain other elements have also been more clearly labeled, and axis legends have also been provided in accordance with the specification. Moreover, FIGS. 7A and 7B are newly added to illustrate the operational state of the CV joint of FIGS. 3-6 when the shafts rotate at respective predetermined positions to transmit and receive rotating power therebetween in accordance with the specification. No new matter is being added.

The specification has been amended as helpfully pointed out to correct the minor typographical error on page 10, and to note that the first and second support frames have portions adjacent both sides of the first and second pulleys, respectively, as recited in Claims 24 and 25. The specification has also been amended to reflect the above-noted changes to the drawings.

Independent Claims 16, 27, and 31 have been amended to more clearly define the subject matter thereof over the prior art. Support for these amendments may specifically be found in original FIGS. 4 and 6, for example. The specification has also been amended for consistency therewith. Moreover, Claims 16, 27, and 31 have been amended to correct

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the noted informalities, and Claim 32 has been amended for consistency with the amendments to Claim 31.

With respect to Claims 16-22, 24-29, 31, and 32, the Examiner rejected these claims under 35 U.S.C. § 112 for not reciting a fixed attachment between the elongate member and the inner ends of the first and second shafts. In particular, the Examiner contended that such a connection was critical and/or essential to the practice of the invention, and therefore should be included in the claims. The Examiner further contended that this was "clearly stipulated in the description on page 8, lines 19-23, where the fixed attachment is described as necessary to prevent the elongate member from slipping in the grooves of the pulley." Office Action, page 4.

It is respectfully submitted that the Examiner has mischaracterized the teachings of the present specification, and that such a fixed attachment is not at all critical to the practice of the invention or required in any of the claims. The sentence to which the Examiner refers in the specification reads as follows:

"In this case, the wire 500 is preferably fixed to the inner ends of the first and second shafts 200 and 210 to prevent the wire 500 from slipping on the circumferential grooves of the first and second pulleys 300 and 310." (Emphasis added).

What is clear from this passage is that a fixed attachment between the inner ends of the first and second shafts and the elongate member is the preferred way of preventing slippage.

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Nowhere does this passage or any other in the specification state or even suggest that a fixed attachment is critical. The MPEP states that "[f]eatures which are merely preferred are not to be considered critical." MPEP 2164.08(c) (emphasis added). In the present case, other approaches could also be used to prevent slippage, such as a fixed attachment between the pulleys and the ends and the elongate member, for example. Accordingly, the Examiner's contention is in error and contradicted by the plain language of the specification, and this rejection should therefore be withdrawn.

In view of the foregoing and the supporting arguments presented in detail below, it is submitted that all of the claims are patentable.

#### **I. The Claimed Invention**

The present invention is directed to a pulley type constant velocity (CV) joint. As recited in amended independent Claim 16, for example, the CV joint includes first and second shafts for transmitting and receiving power therebetween, and a first pulley directly connected to an end of the first shaft. The first pulley has circumferential grooves defined therein. Moreover, a second pulley is directly connected to an end of the second shaft, and the second pulley also has circumferential grooves defined therein. The CV joint further includes a first elongate member wound around a first set of the circumferential grooves of the first and second pulleys for causing the first and second pulleys to rotate about respective centers thereof in a first direction. More particularly, the first elongate member has first and second ends respectively connected to the first and second pulleys

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adjacent the first and second shafts.

Moreover, the CV joint also includes a second elongate member wound around a second set of the circumferential grooves of the first and second pulleys for causing the first and second pulleys to rotate about the respective centers thereof in a second direction opposite the first direction. The second elongate member has first and second ends respectively connected to the first and second pulleys adjacent the first and second shafts. Further, the CV joint also includes a first support frame rotatably supporting the first pulley and a second support frame rotatably supporting the second pulley. Additionally, the first and second support frames have respective ends rotatably connected together. The CV joint thus provides a relatively simple and reliable architecture which allows the range of the intersection angle of input and output shafts to be enhanced while transmitting the axial rotating velocity of the first shaft to the second shaft.

Independent Claims 27 and 31 are directed to similar CV joints. Each of these claims has also been amended to recite a direct connection between the first and second shafts and first and second pulleys, respectively, as in Claim 16.

## **II. The Claims Are Patentable**

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A. Lowry and Forsyth

The Examiner rejected independent Claim 31 over Lowrey (U.S. Patent No. 854,426) and Forsyth (U.S. Patent No. 1,403,679). (It should be noted that the Examiner mistakenly referred to Claim 31 as Claim 32 on pages 5 and 6 of the Office Action.) Lowry is directed to a shaft coupling device including first and second disks to be connected to ends of first and second shafts, respectively, and a plurality of connecting straps (i.e., rubber or leather straps) connected between the disks. See FIG. 1 of Lowry.

Forsyth is directed to a universal joint which includes a pair of opposing shafts having intersecting axes, and a respective set of prongs projecting from each shaft. The individual prongs of each set are spaced different distances from the axis of the shaft. The joint further includes first and second flexible loops connecting outer and inner prongs of the two sets, respectively. See FIGS. 1-2 of Forsyth.

Independent Claim 31 has been amended to recite first and second pulleys directly connected to ends of the first and second shafts. This claim also recites that the first and second elongate members respectively cause the first and second pulleys to move symmetrically about respective centers thereof in opposite directions to provide the first and second shafts with a first degree of freedom. Neither Lowry nor Forsyth teach or fairly suggest any pulleys in the devices thereof, nor elongate members for causing pulleys to rotate about centers thereof. Accordingly, the rejections of Claim 31 based upon these references should be withdrawn.

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B. Thompson

The Examiner rejected independent Claims 16, 27, and 31 based upon Thompson (U.S. Patent No. 6,139,437). This patent is directed to an equal angle guide mechanism for double universal joints. The Examiner notes an embodiment thereof illustrated in FIGS. 5A-5E in which flexible elements **515-518**, such as cables or chains, are used to rotate pulleys **504, 505, and 524, 525**. The pulley pairs are rotatably mounted to a driving cross member **503** and a driven cross member **523** via respective trunions **511, 512, and 531, 532**. A driving shaft **501** is joined to a driving end yoke **502**, to which the driving cross member **503** is pivotally mounted. Similarly, a driven shaft **521** is joined to a driven end yoke **522**, to which the driven cross member **523** is pivotally mounted.

In stark contrast, the above-noted independent claims recite that the first and second pulleys are directly connected to the respective ends of the first and second shafts. As noted above, the pulleys of the Thompson joint are not directly connected to the driving and driven shafts thereof. In fact, the inclusion of the pivotal yokes in the Thompson joint to provide a degree of rotational freedom for the shafts that is in a different direction than the pulleys rotate would have taught one of skill in the art away from making such a direct connection, as this would have changed the principle of operation of this joint.

Instead of using the rather complicated pivotal yoke configuration of Thompson, the claimed CV joint provides the advantages discussed above with a relatively less complex architecture. That is, the first and second shafts of the

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claimed invention may be directly connected to the first and second pulleys but still enjoy two degrees of rotational freedom. Since none of the remaining art of record teaches or fairly suggests the above-noted deficiency, the rejection of the above-noted independent claims based upon Thompson should be withdrawn.

Accordingly, it is submitted that independent Claims 16, 27, and 31 are patentable over the prior art. Their respective dependent claims, which recite yet further distinguishing features, are also patentable over the prior art and require no further discussion herein.

#### **CONCLUSIONS**

In view of the amendments to the claims and the arguments presented above, it is submitted that all of the claims are patentable. Accordingly, a Notice of Allowance is respectfully requested in due course. Should any minor informalities need to be addressed, the Examiner is encouraged to contact the undersigned attorney at the telephone number listed below.



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Respectfully submitted,

A handwritten signature in cursive script, reading "John F. Woodson II". The signature is written in dark ink and is positioned above a horizontal line.

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